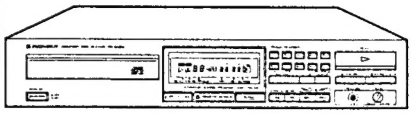
Service Manual



ORDER NO.
ARP1330

COMPACT DISC PLAYER

PD-5050
PD-5050-S

MODEL PD-5050 AND PD-5050-S COMES IN TWO VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Applicable model		Power requirement	Export destination
	PD-5050	PD-5050-S		
HEM	O	O	AC220V, 240V (switchable)	Europian continent
HB	O	—	AC220V, 240V (switchable)	United Kingdom

- This service manual is applicable to the HEM and HB types.
- As to the HB type, please refer to page 75.
- Ce manuel d'instruction se refère au mode de réglage en français.
- Este manual de servicio trata del método ajuste escrito en español.

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PIONEER ELECTRONICS SERVICE INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
PIONEER ELECTRONICS OF CANADA, INC. 505 Cochrane Drive, Markham, Ontario L3R 6B8 Canada TEL: [416] 479-4411
PIONEER ELECTRONIC [EUROPE] N.V. Keetberglaan 1, 2740 Beveren, Belgium TEL: 03/775 · 28 · 08
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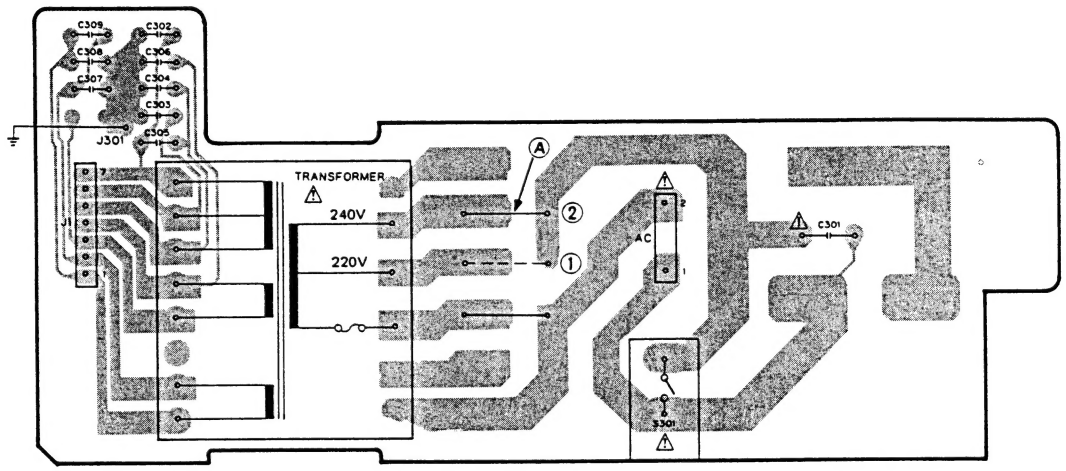
For PD-5050

- Line voltage selection (for HEM and HB types)

1. Disconnect the AC power cord.
2. Remove the bonnet case.
3. Change the position of the jumper Ⓐ as follows.

Voltage	Jumper Ⓐ position
220V	①
240V	②

TRANSFORMER BOARD ASSEMBLY



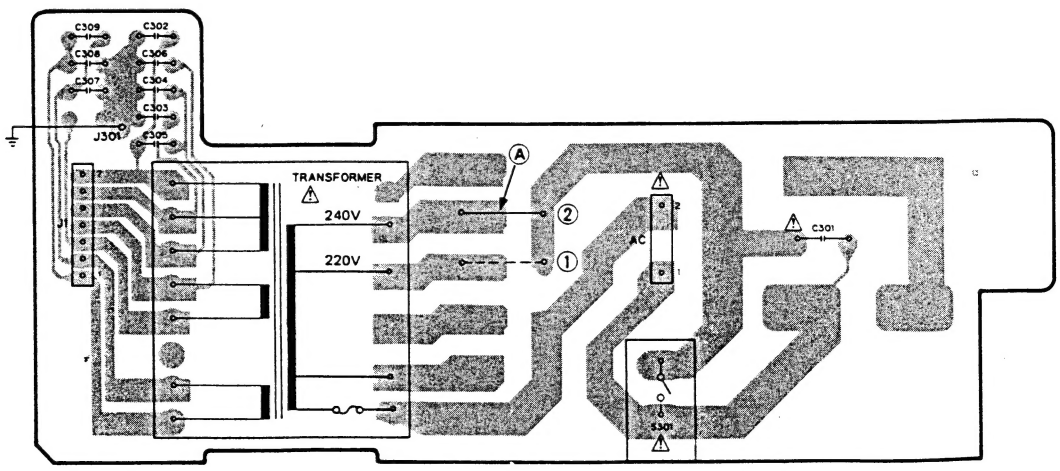
For PD-6050

- Line voltage selection (for HEM and HB types)

1. Disconnect the AC power cord.
2. Remove the bonnet case.
3. Change the position of the jumper Ⓐ as follows.

Voltage	Jumper Ⓐ position
220V	①
240V	②

TRANSFORMER BOARD ASSEMBLY



THE FIGURE OF THE LINE VOLTAGE SELECTION IN THIS MANUAL IS INCORRECT.

PLEASE REPLACE IT WITH THE FOLLOWING REVISION.

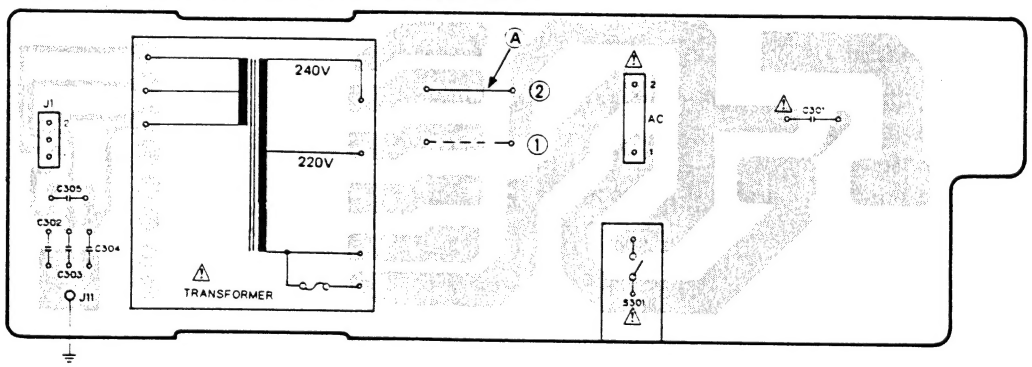
For PD-4050

- Line voltage selection (for HEM and HB types)

1. Disconnect the AC power cord.
2. Remove the bonnet case.
3. Change the position of the jumper Ⓐ as follows.

Voltage	Jumper Ⓐ position
220V	①
240V	②

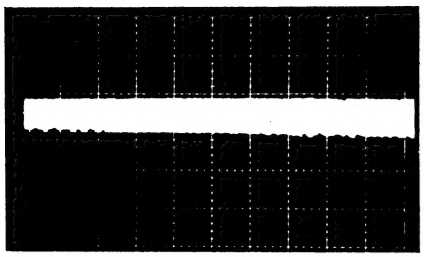
TRANSFORMER BOARD ASSEMBLY



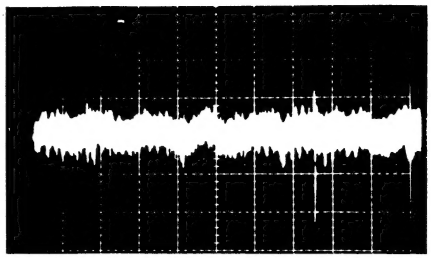
WAVE FORMS

NOTE: The encircled numbers denote measuring points in the circuit and pattern diagrams.

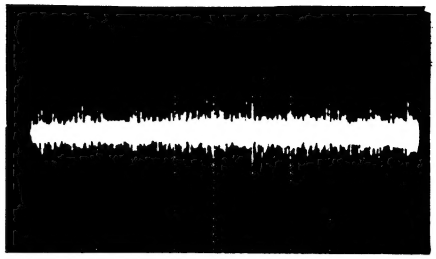
① CN1-5 Pin: PLAY MODE
100mV/Div 5m sec/Div



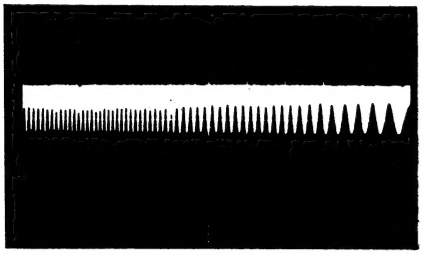
③ TP-1-6 Pin: SEARCH MODE
500m/Div 10mS/Div



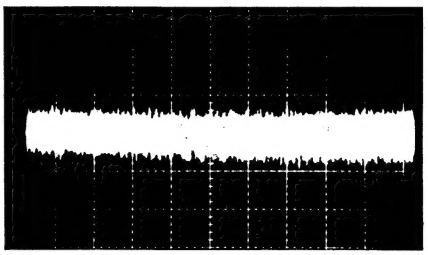
⑥ Q6E: PLAY MODE
2V/Div 10mS/Div



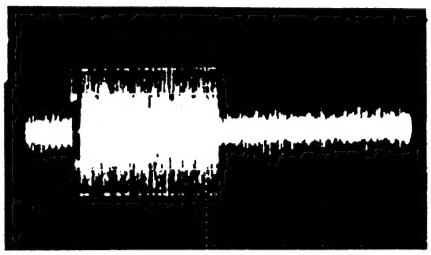
① CN1-5 Pin: SEARCH MODE
100mV/Div 5mS/Div



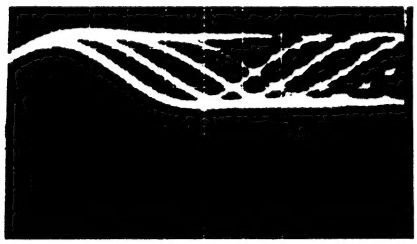
④ TP1-2 Pin: PLAY MODE
1V/Div 10mS/Div



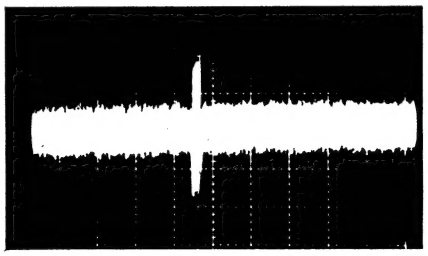
⑥ Q6E: SEARCH MODE
2V/Div 50mS/Div



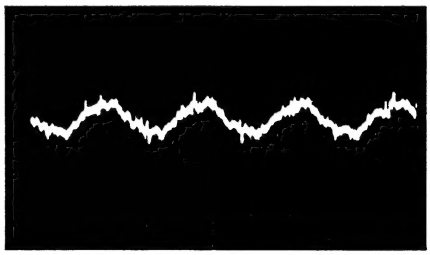
② TP1-1 Pin: PLAY MODE
1V/Div 200n sec/Div



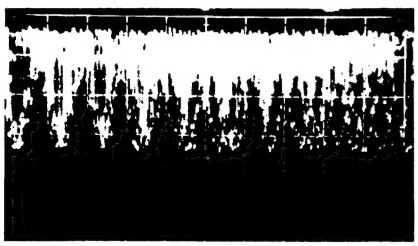
④ TP1-2 Pin: SEARCH MODE
1V/Div 10mS/Div



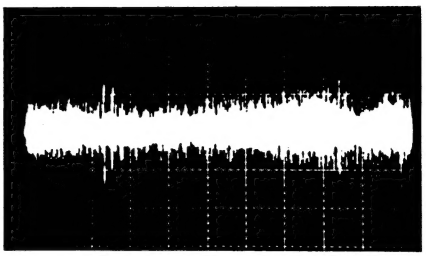
⑦ Q2E: PLAY MODE
2V/Div 50mS/Div



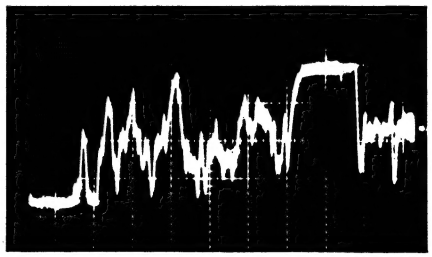
② TP1-1 Pin: SEARCH MODE
500mV/Div 5m sec/Div



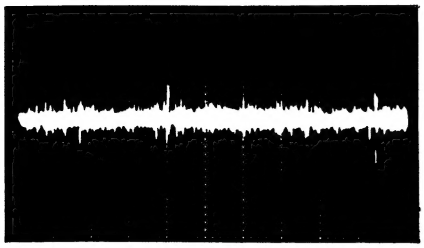
⑤ Q4 Emitter: PLAY MODE
2V/Div 10mS/Div



⑦ Q2E: SEARCH MODE
2V/Div 100mS/Div

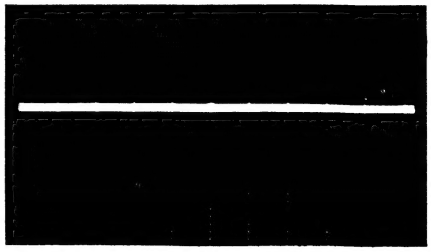


③ TP1-6 Pin: PLAY MODE
500mV/Div 10m sec/Div

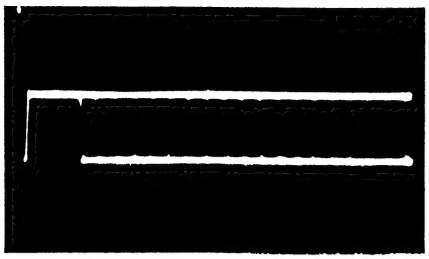


⑤ Q4E: SEARCH MODE
2V/Div 10mS/Div

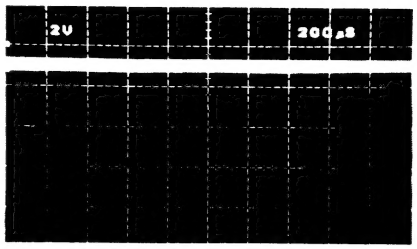
⑧ IC2, 34 Pin: PLAY MODE
2V/Div 10mS/Div



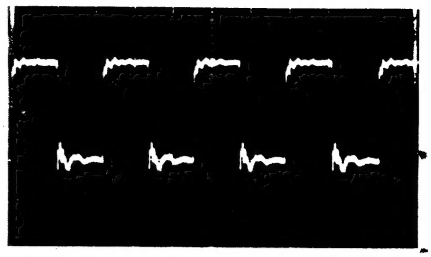
⑨ IC1 27 Pin: PLAY MODE
2V/Div 500n sec/Div



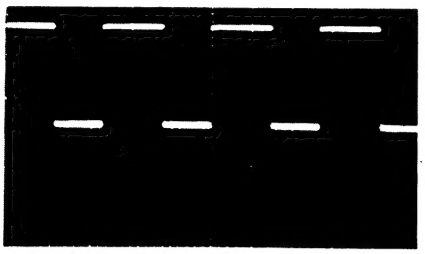
⑫ TP2-1: PLAY MODE
2V/Div 200μS/Div



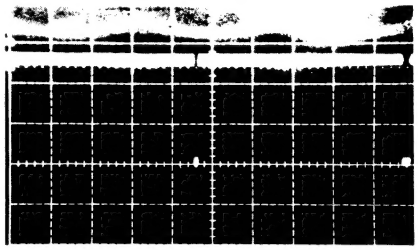
⑯ IC3-76: STOP MODE
2V/Div 200nS/Div



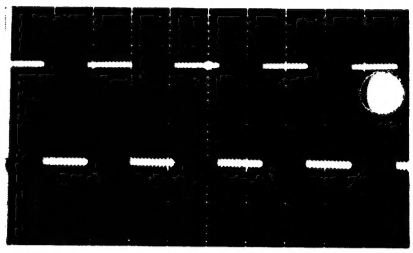
⑩ IC3-4: PLAY MODE
2V/Div 50μS/Div



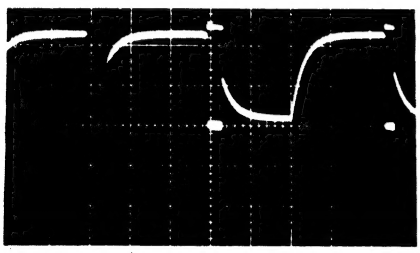
⑫ TP2-1: SEARCH MODE
2V/Div 20mS/Div



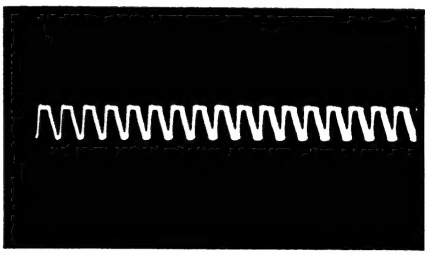
⑰ IC3-79: STOP MODE
2V/Div 5μS/Div



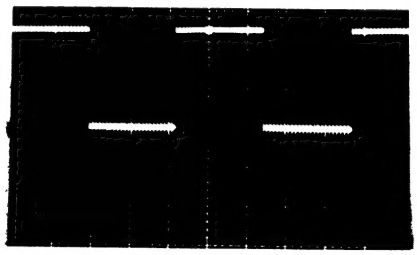
⑩ IC3-4: SEARCH MODE
2V/Div 100mS/Div



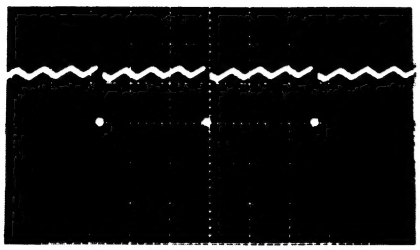
⑬ IC2-38: PLAY MODE
2V/Div 200μS/Div



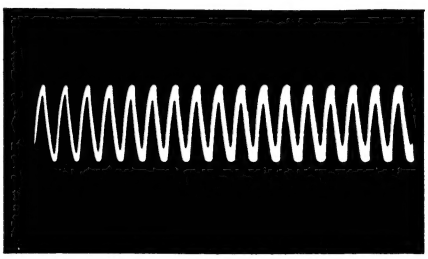
⑱ IC3-80: STOP MODE
2V/Div 5μS/Div



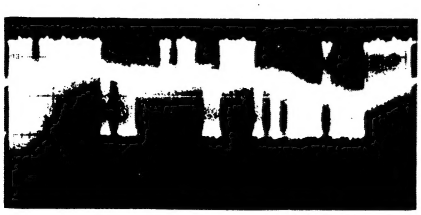
⑪ IC3-3: PLAY MODE
2V/Div 200μS/Div



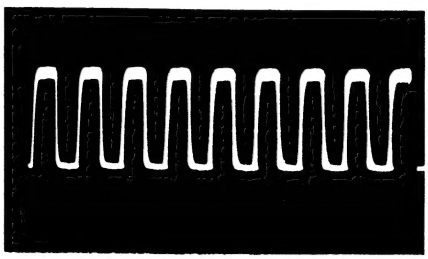
⑭ IC3-8: PLAY MODE
2V/Div 200μS/Div



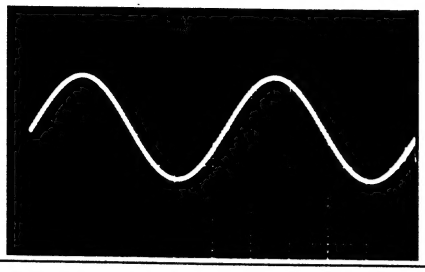
⑪ IC3-3: SEARCH MODE
2V/Div 10mS/Div



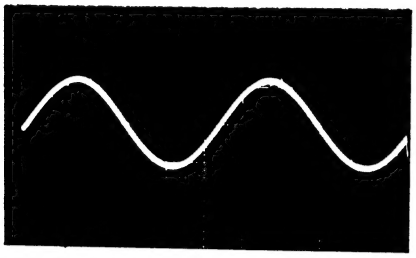
⑮ TP2-2: PLAY MODE
2V/Div 200μS/Div



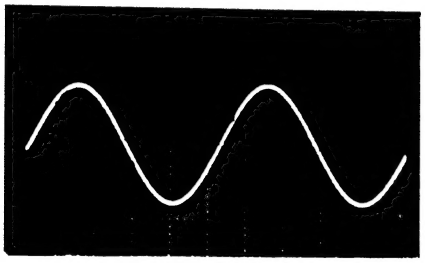
⑲ IC5-9: PLAY MODE
2V/Div 200μS/Div



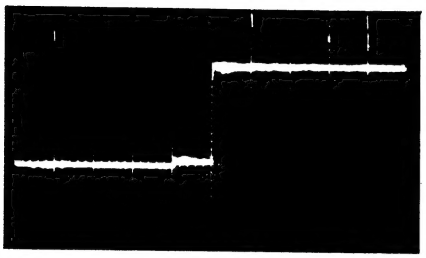
⑳ IC25-1: PLAY MODE
2V/Div 200μS/Div



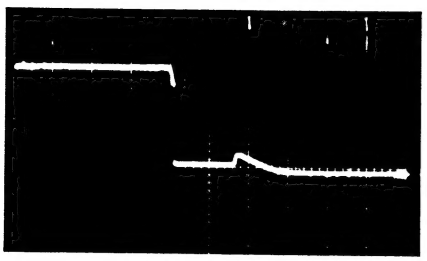
㉑ OUTPUT Lch: PLAY MODE
2V/Div 200μS/Div



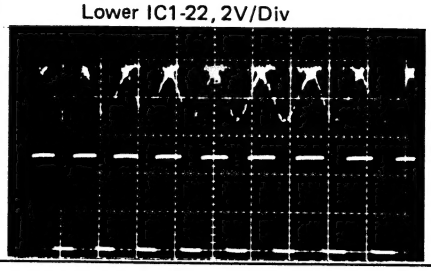
㉒ IC10-5: POWER ON
2V/Div 500mS/Div



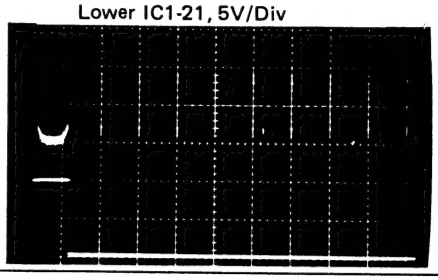
㉒ IC10-5: POWER-OFF
2V/Div 100mS/Div



㉓ IC1-22: TR OPEN
1mS/Div
Upper TP1-1, 1V/Div
Lower IC1-22, 2V/Div

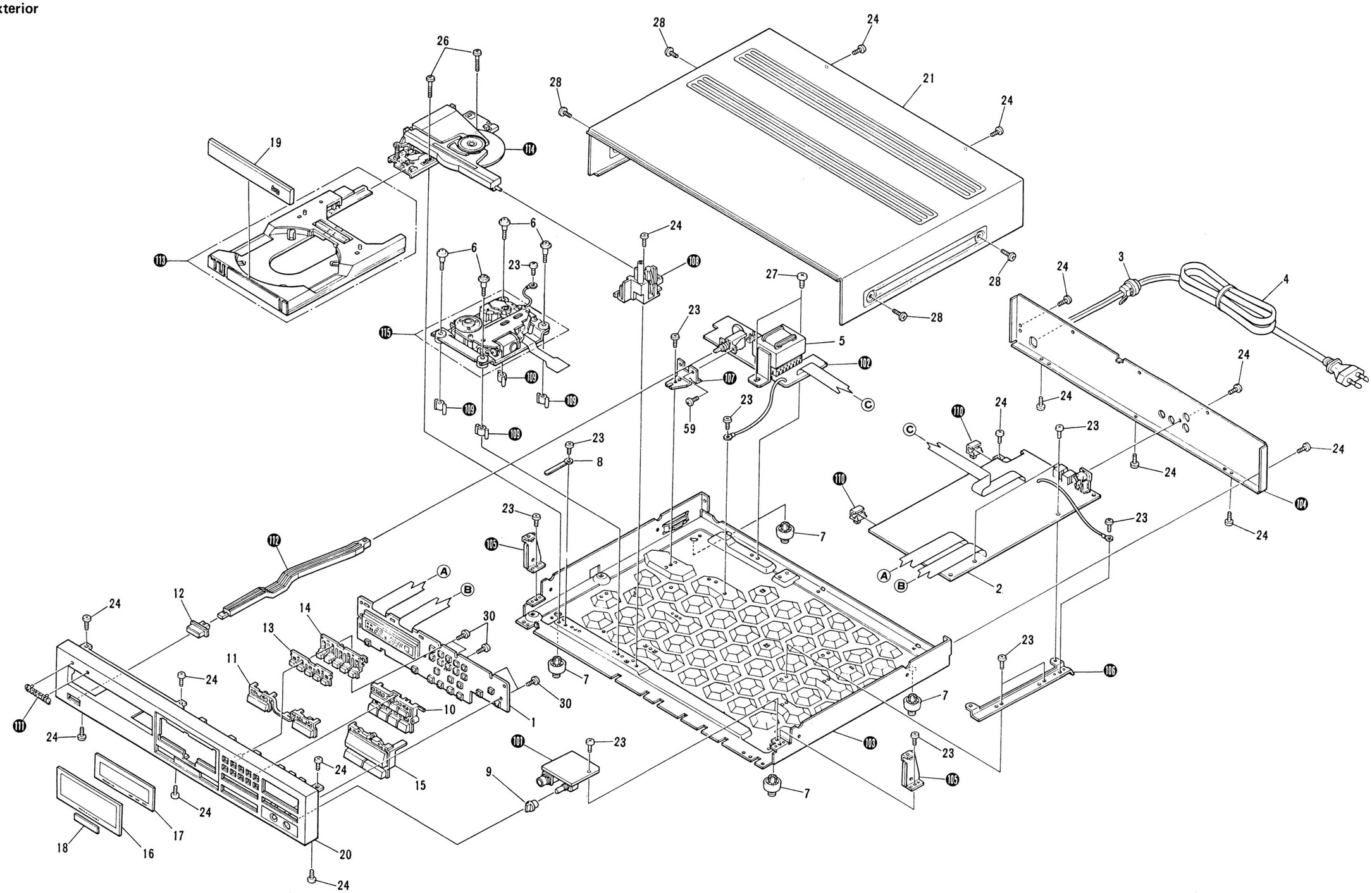


㉔ IC1-21: DFCT
1mS/Div
Upper TP1-1, 1V/Div
Lower IC1-21, 5V/Div



5. EXPLODED VIEWS AND PARTS LIST

5.1 Exterior



NOTES:

- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

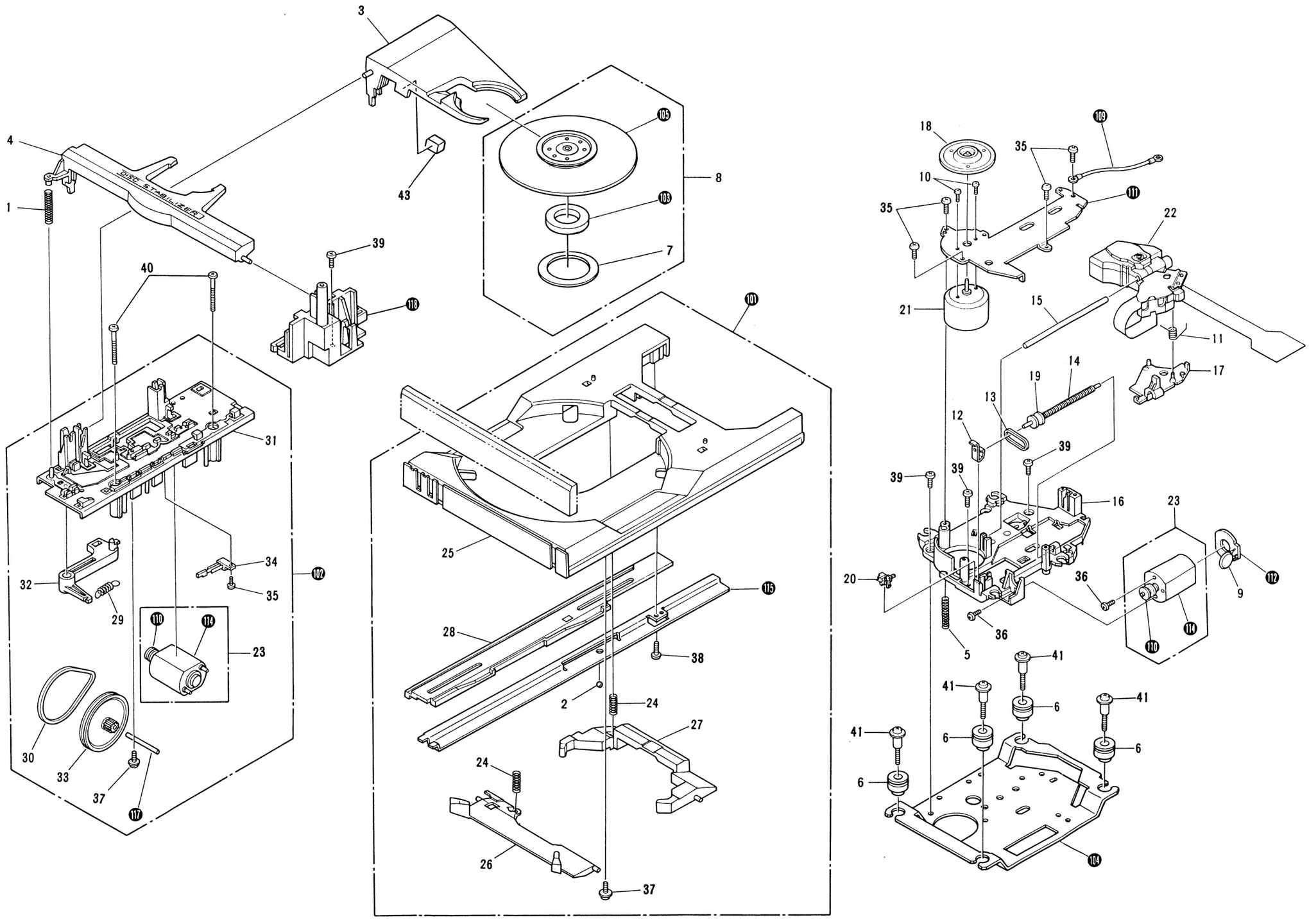
Parts List of Exterior

Mark	No.	Part No.	Description
⚠ ⊙	1.	PWZ1144	Function board assembly
⚠ ⊙	2.	PWZ1212	Main board assembly
⚠	3.	CM-22B	Strain relief
⚠	4.	PDG1003	AC power cord
⚠ ★	5.	PTT1012	Power transformer (AC220V/240V)
	6.	PBA1001	Screw
	7.	REC-369	Foot assembly
	8.	RNH-184	Cord clamper
	9.	PAC-266	Knob (PHONES LEVEL)
	10.	PAC1054	Button (FUNCTION)
	11.	PAC1056	Button B (O/C)
	12.	PAC1058	Button (POWER)
	13.	PAC1075	Button 2
	14.	PAC1076	Button 3
	15.	PAC1095	Button 1B
	16.	PAM1032	Window B
	17.	PAM1034	Filter B
	18.	PAM1053	Name plate C
	19.	PNW1071	Plate A
	20.	PNW1089	Function panel C
	21.	PNA1107	Bonnet
	22.		.....
	23.	BBZ30P060FMC	Screw
	24.	BBZ30P080FZK	Screw
	25.		.....
	26.	BBZ30P230FMC	Screw
	27.	IPZ40P080FCC	Screw
	28.	FBT40P080FZK	Screw
	29.	PMZ30P060FMC	Screw
	30.	PPZ30P080FMC	Screw
	101.		Headphone board assembly
	102.		Transformer board assembly
	103.		Under base
	104.		Rear base
	105.		Angle
	106.		P.C. Board angle
	107.		Switch angle
	108		Slide guide
	109.		Mechanism support
	110.		P.Plate holder
	111.		Name plate
	112.		SW joint
	113.		Tray assembly
	114.		Loading assembly
	115.		Servo mechamism assembly

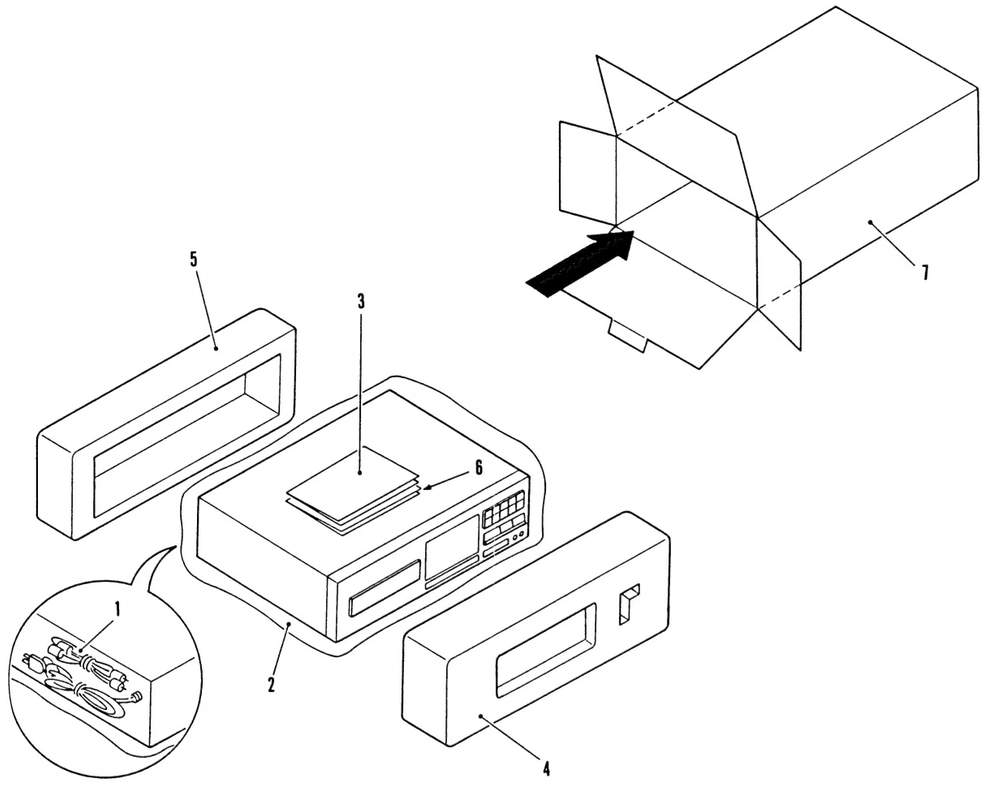
5.2 Mechanism section

Parts List of Mechanism Section

Mark	No.	Part No.	Description
	1.	PBH1013	Spring
	2.	PBP-001	Steel ball ϕ4
	3.	PNW1084	Clamp holder
	4.	PNW1085	Clamp retainer
	5.	PBH1009	Spring
	6.	PEB1031	Floating rubber
	7.	PNM1010	Disc cushion
	8.	PYY1028	Clamper assembly
	9.	CGDYX104M25	Semiconductive ceramic capacitor
	10.	PBA-209	Screw M 2x3
	11.	PBH1008	Drive spring
	12.	PBK1010	Plate spring
★★	13.	PEB1012	Belt (CARRIAGE)
	14.	PLA1003	Drive worm
	15.	PLA1004	Guide bar
	16.	PNW1062	Mechanism chassis
	17.	PNW1063	Carriage plate
	18.	PNW1064	Disc table
	19.	PNW1066	Pulley
★★	20.	PSH1003	Slide switch (INSIDE)
★★	21.	PXM1001	Spindle motor
	22.	PWY1003	Pick up assembly
★★	23.	PYY1025	Motor assembly (CARRIAGE LOADING)
	24.	PBH1011	Spring
	25.	PNW1079	Tray
	26.	PNW1183	Disc lever (F)
	27.	PNW1081	Disc lever (R)
	28.	PNW1082	Rack
	29.	PBH1012	Clamp spring
★★	30.	PEB1013	Belt (LOADING)
	31.	PNW1069	Loading base
	32.	PNW1083	Clamp lever
	33.	PNW1171	Gear pulley
★★	34.	VSK-015	Leaf switch (OPEN/CLMP)
	35.	BPZ20P080FZK	Screw
	36.	PMZ20P030FMC	Screw
	37.	IPZ30P060FMC	Screw
	38.	PPZ30P080FMC	Screw
	39.	BBZ30P080FMC	Screw
	40.	BBZ30P230FMC	Screw
	41.	PBA1001	Screw
	42.		.....
	43.	PEB1032	Stopper rubber
	101.		Tray assembly
	102.		Loading base assembly
	103.		Magnet
	104.		Ballast base
	105.		Clamper
	106.		.....
	107.		.....
	108.		.....
	109.		Earth lead unit
	110.		Motor pulley
	111.		Base plate
	112.		Carriage M board
	113.		Table ring
	114.		Motor (CARRIAGE, LOADING)
	115.		Slide base
	116.		.....
	117.		Gear shaft
	118.		Slide guide


DISC STABILIZER
3
4
1
43
105
8
103
7
39
40
118
101
31
25
34
35
102
32
29
110
114
23
28
115
38
2
24
27
30
33
37
117
24
26
37
18
109
35
10
35
111
22
21
15
11
17
19
14
13
12
39
39
39
16
23
20
36
9
112
36
5
110
114
41
41
6
41
6
6
41
6
104

6. PACKING

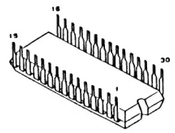


Parts List of Packing

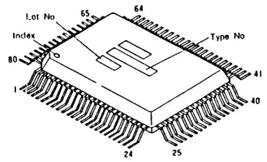
Mark	No.	Part No.	Description
	1.	PDE1001 (PDE1002)	Connection cord
	2.	VHL-037	Sheet
	3.	PRE1015	Operating instructions (English/French)
	4.	PHA1013	Protector (F)
	5.	PHA1014	Protector (R)
	6.	PRF1004	Operating instructions (German/Italian)
	7.	PHG1060	Packing case

External appearance of transistors and ICs

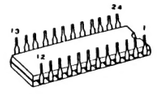
CXA1081S



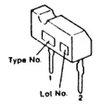
CXD1125QZ



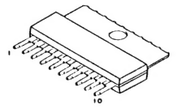
CXK5816PN



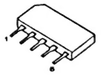
ICP-F10



LA6510

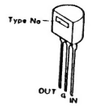


M51957AL

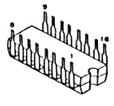


M5238PF

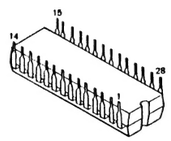
NJM78L05A



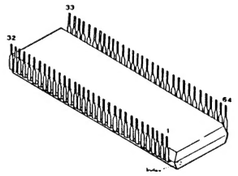
PCM56P
BU4053



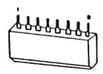
PDE003



PD3092A

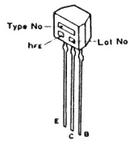


M5218L

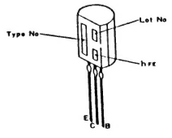


DTA124ES
DTC124ES

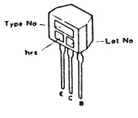
2SA1048



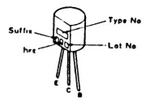
2SA1399
2SC3581



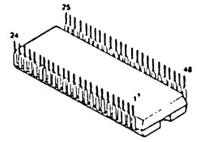
2SA933S
2SC1740S



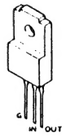
2SD1302



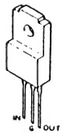
CXA1082AS



NJM79M05FA

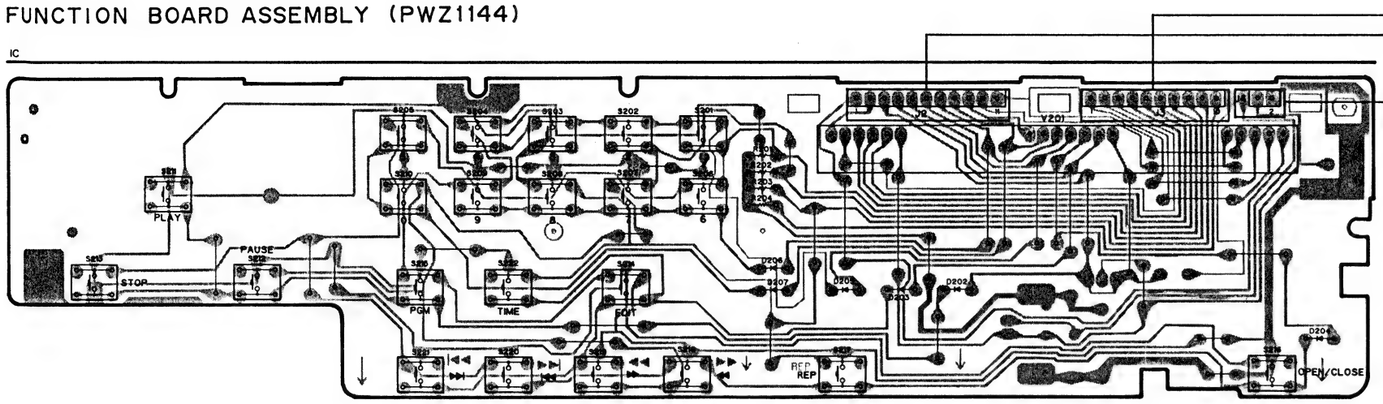


NJM78M05FA



7. P.C. BOARDS CONNECTION DIAGRAM

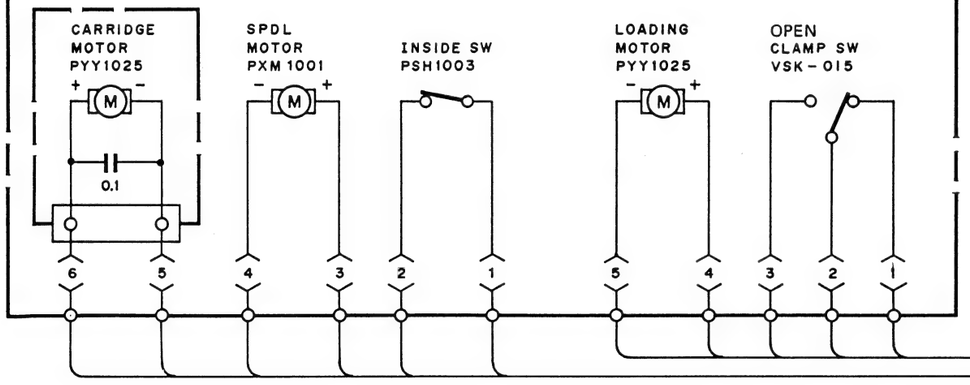
FUNCTION BOARD ASSEMBLY (PWZ1144)



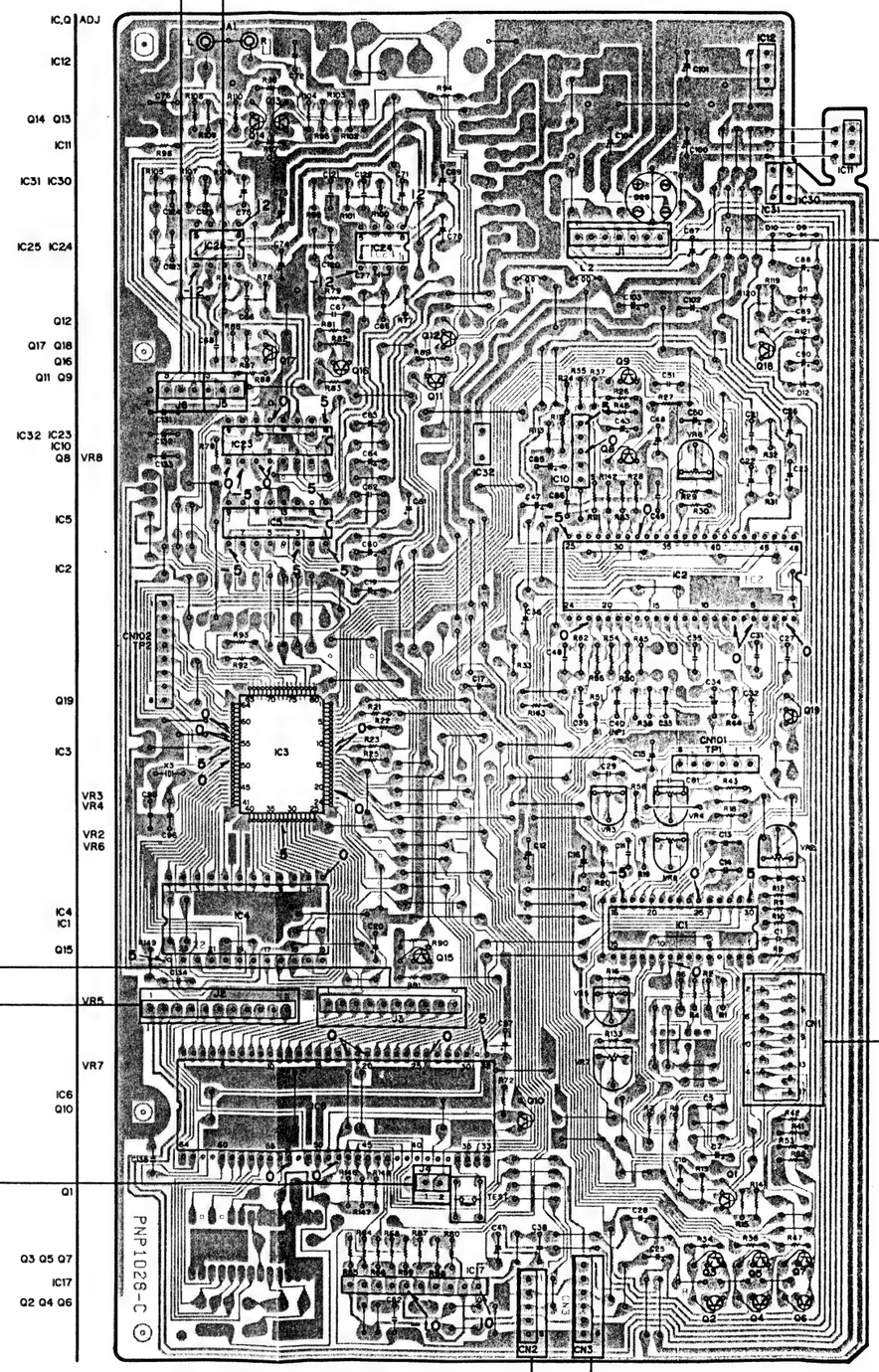
DIRECTION	CN3	
	5	6
FORWARD	+	−
REVERSE	−	+

DIRECTION	CN3	
	3	4
FORWARD	+	−
REVERSE	−	+

DIRECTION	CN2	
	4	5
LOADING IN	−	+
LOADING OUT	+	−

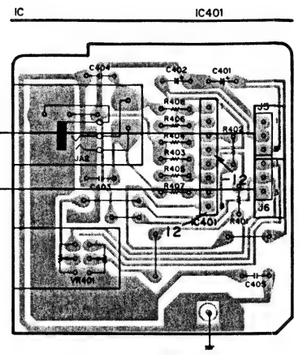


MAIN CIRCUIT BOARD ASSEMBLY (PWZ1212)

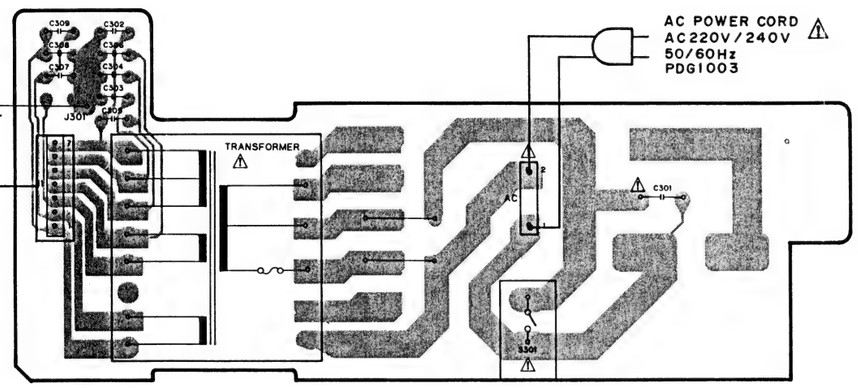


(PWZ1212)

HEADPHONE BOARD ASSEMBLY

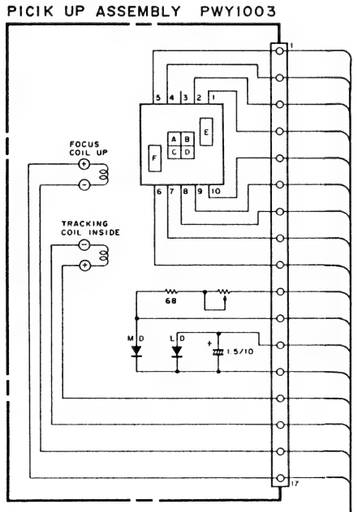


POWER SUPPLY BOARD ASSEMBLY

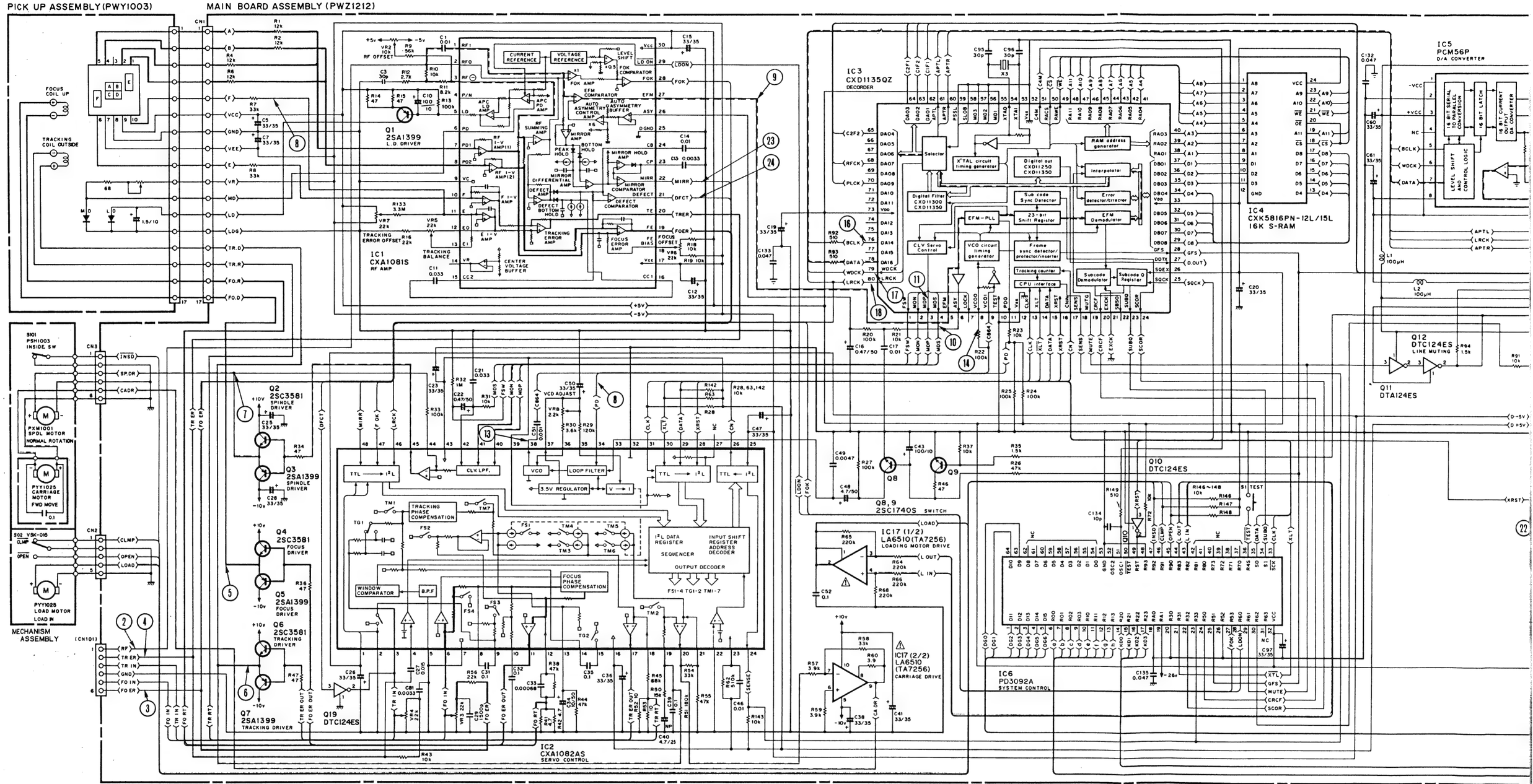


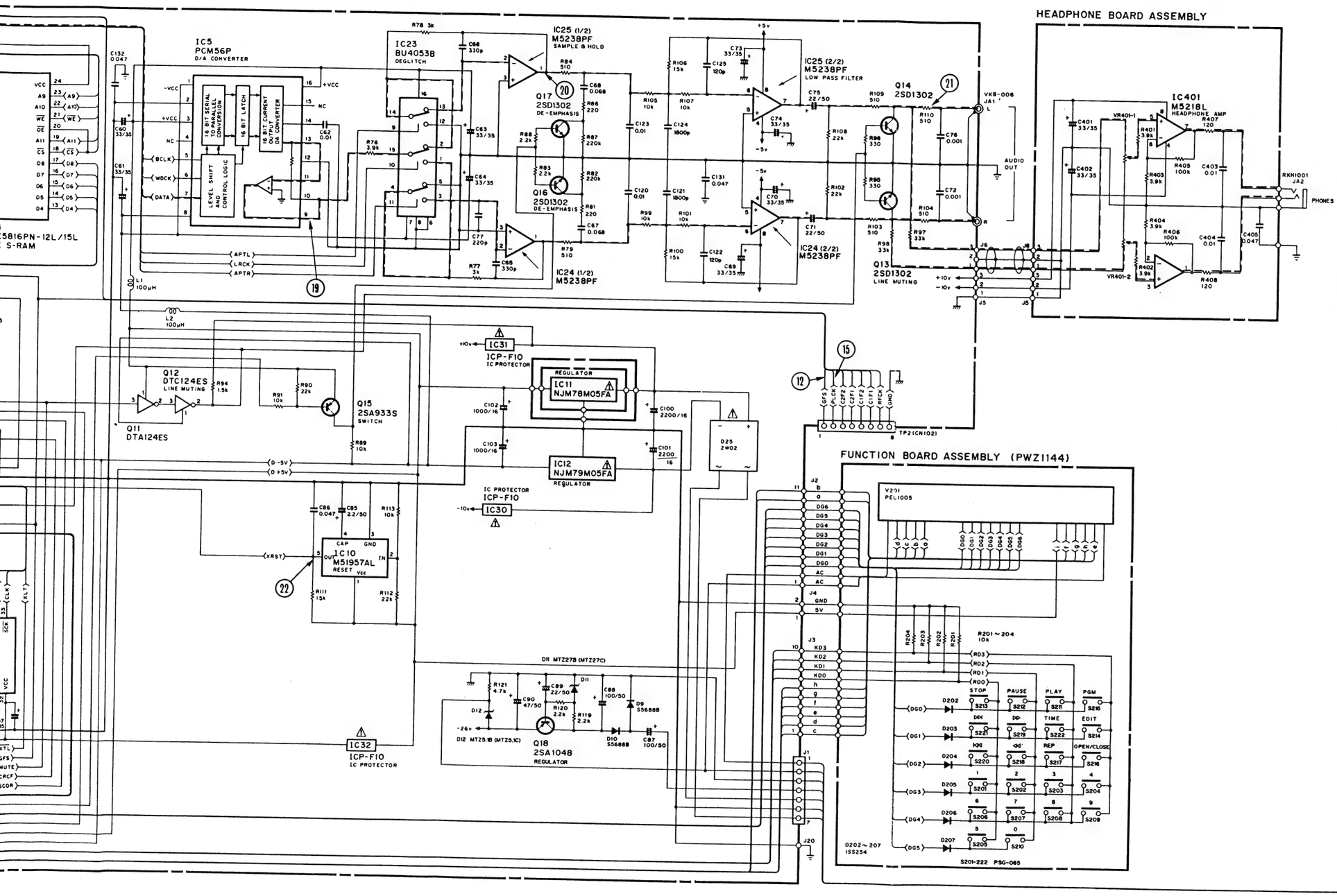
PICK UP ASSEMBLY (PWZ1003)

PICIK UP ASSEMBLY PWY1003



8. SCHEMATIC DIAGRAM





NOTE:
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.

FOCUS SERVO LOOP ———
SIGNAL LINE - - - - - - - -
TRACKING SERVO LOOP ———
CARIDGE SERVO LOOP — — — — — —
LOADING MOTOR ———
SPINDLE SERVO LOOP - - - - - - - -

NOTE:

1. RESISTORS:
   Indicated in Ω, 1/8W & 1/4W, ±5% tolerance unless otherwise noted k; kΩ, M; MΩ, (F); ±1%, (G); ±2%, (K); ±10%, (M); ±20% tolerance

2. CAPACITORS:
   Indicated in capacity (μF)/voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.

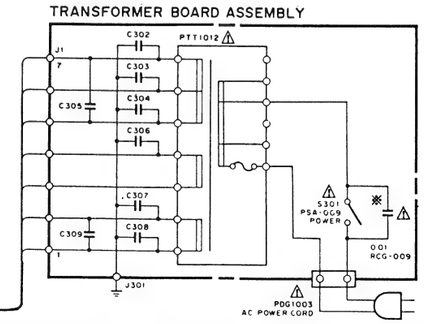
3. VOLTAGE, CURRENT:
   ▭; DC voltage (V) at no input signal
   Value in ( ) is DC voltage at rated power.
   mA; DC current at no input signal

4. OTHERS:
   ➡; Signal route.
   ⊘; Adjusting point.

The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
* marked capacitors and resistors have parts numbers.
The underlined indicates the switch position.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

TRANSFORMER BOARD ASSEMBLY



9. ELECTRICAL PARTS LIST

NOTES:

- *Parts without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω	*56 × 10¹*	*561*	*RD1/4PS 5 6 1 J*
47kΩ	*47 × 10³*	*473*	*RD1/4PS 4 7 3 J*
0.5Ω	*0R5*		*RN2H 0 R 5 K*
1Ω	*010*		*RS1P 0 1 0 K*

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ	*562 × 10¹*	*5621*	*RN1/4SR 5 6 2 1 F*

Miscellaneous Parts

P.C. BOARD ASSEMBLIES

Mark	Symbol & Description	Part No.
⚠ ⊙	Main board assembly	PWZ1212
⚠	Headphone board assembly	
⚠ ⊙	Function board assembly	PWZ1144
⚠	Transformer board assembly	

OTHERS

Mark	Symbol & Description	Part No.
⚠	Strain relief	CM-22B
⚠	AC power cord	PDG1003
★★	Spindle motor	PXM1001
★★	Motor assembly (CARRIAGE, LOADING)	PYY1025
★★	Slade switch (INSIDE)	PSH1003
★★	Leaf switch (OPEN/CLMP)	VSK-015
	Pik up assembly	PWY1003

⚠ ⊙ Main Board Assembly (PWZ1212)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC23	BU4053B
★★	IC1	CXA1081S
★★	IC2	CXA1082AS
★★	IC3	CXD1135QZ
★★	IC4	CXK5816PN-12L (CXK5816PN-15L)
⚠ ★★	IC30, IC31, IC32	ICP-F10
★★	IC17	LA6510
★★	IC10	M51957AL
★★	IC24, IC25	M5238PF
★★	IC11	NJM78M05FA
★★	IC12	NJM79M05FA
★★	IC5	PCM56P
★★	IC7	PDE003
★★	IC6	PD3092A
★★	Q11	DTA124ES
★★	Q10, Q12, Q19	DTC124ES
★★	Q18	2SA1048
★★	Q1, Q3, Q5, Q7	2SA1399
★★	Q15	2SA933S
★★	Q8, Q9	2SC1740S
★★	Q2, Q4, Q6	2SC3581
★★	Q13, Q14, Q16, Q17	2SD1302
★	D11	MTZ27B (MTZ27C)
★	D12	MTZ5.1B (MTZ5.1C)
★	D9, D10	S5688B
	D25	2W02

CAPACITORS

Mark	Symbol & Description	Part No.
	C134	CCCSL10050
	C95, C96, C3	CCCCH300J50
	C16, C22	CEAR47M50
	C52	CGCYX104M25
	C120, C123	CFTXA103J50
	C67, C68	CFTXA683J50
	C131–C133, C135	CKCYF473Z50
	C69, C70, C73, C74	CEAS330M35
	C34	CEAS100M50
	C87, C88	CEAS101M50
	C102, C103	CEAS102M16
	C85	CEAS2R2M50
	C71, C75, C89	CEAS220M50
	C100, C101	CEAS222M16
	C5, C7, C20, C23, C25, C26, C28, C38, C41, C50, C60, C61, C63, C64, C12, C15, C19, C36, C47	CEAS330M35
	C84, C97	CEAS330M35
	C90	CEAS470M50
	C106, C107	CEAS471M25
	C10, C43	CEA101M10
	C48	CEA4R7M50
	C33	CQMA681K50
	C51	CQMA102K50
	C1, C17, C46, C62	CQMA103K50
	C31, C32,C39, C35, C14	CQMA104K50
	C29	CQMA152J50
	C11, C21	CQMA333K50
	C49	CQMA472K50
	C67, C68	CFTXA683J50
	C65, C66	CQSA331J50
	C72, C76	CQSA102J50
	C86	CQMA473J50
	C13	CQMA331J50
	C27	CQMA153K50

RESISTORS

Mark	Symbol & Description		Part No.
★	VR3, VR4, VR5, VR6, VR7	Semi-fixed resistor (22k)	VRTB6VS223
★	VR8	Semi-fixed resistor (2,2k)	VRTS6VS222
	VR2	Semi-fixed resistor (10k)	VRTB6VS103
	R30	Metal film resistor	RN1/6PQ3601F
		Other resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description		Part No.
	JA1	2P terminal (AUDIO OUT)	VKB-006
★	X3	Crystal resonator	PSS-012

⚠ Headphone Board Assembly

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
★★	IC401	M5218L

CAPACITORS

Mark	Symbol & Description	Part No.
	C401, C402	CEAS330M35
	C403, C404	CKCYF103Z50
	C405	CKCYF473Z50

RESISTORS

Mark	Symbol & Description		Part No.
★	VR401	Variable resistor (PHONES LEVEL)	PCS1001
		Other resistors	RD1/6PM□□□L

OTHERS

Mark	Symbol & Description		Part No.
	JA2	Headphone jack (PHONES)	RKN1001

⚠ Transformer Board Assembly

SWITCH

Mark	Symbol & Description		Part No.
⚠ ★★	S301	Power switch	PSA-009

Transformer

Mark	Symbol & Description	Part No.
⚠ ★	Power transformer (AC220V/240)	PTT1012

CAPACITORS

Mark	Symbol & Description		Part No.
	C302-C309		CKCYF103Z50
⚠	C301	(0.01μF)	RCG-009

⚠ ⊙ Function Board Assembly (PWZ1144)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D202–D207	1SS254

SWITCHES

Mark	Symbol & Description		Part No.
★★	S201–S222	Tact switch (OPERATION)	PSG-065

OTHERS

Mark	Symbol & Description		Part No.
★	V201	Fluorescent tube	PEL1005

10. ADJUSTMENTS

The adjustments for this unit are given below. Adjustments must be made in the order in which they are listed.

● ADJUSTMENTS

1. Tracking error offset, focus offset and RF offset adjustment
2. LD (laser diode) power check
3. Focus lock and spindle lock check
4. Grating adjustment
5. Tracking balance adjustment
6. Tangential adjustment
7. RF level check
8. Focus gain adjustment
9. Tracking gain adjustment
10. VCO free run frequency adjustment

● REQUIRED EQUIPMENT

1. Dual trace oscilloscope
2. Optical power meter
3. Test disc (YEDS-7)
4. Loop gain adjustment filter
5. Signal generatorr
6. Frequency counter
7. Other regular measuring equipment

● ABOUT THE TEST MODE

All adjustments must be carried out with the unit in the test mode.

How to activate and release the test mode

① To activate the test mode, turn ON the power switch (S301) with the test mode switch (S1) in the ON position.

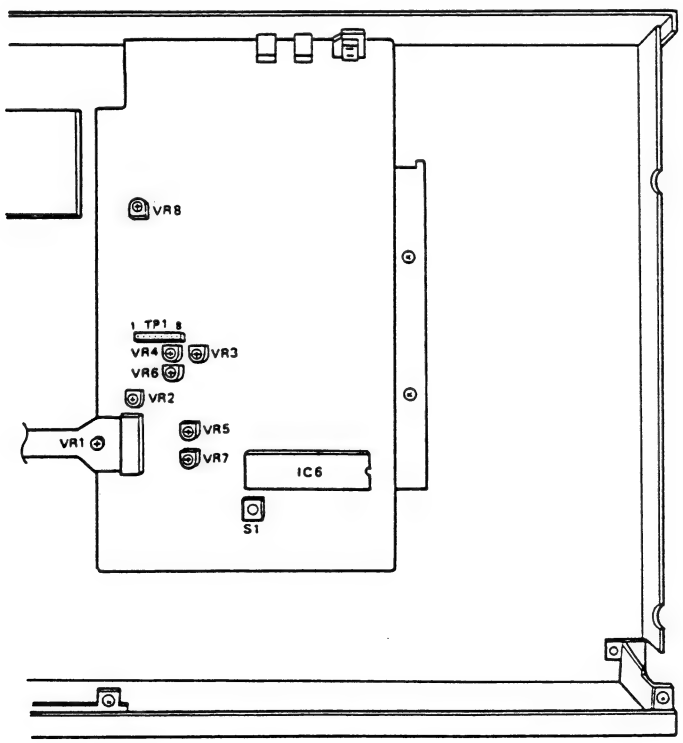
② The test mode is released by turning the power switch OFF.

The functions of the keys in the test mode are outlined in Table 10-1.

● ADJUSTMENT VRs AND THEIR NAMES

VR1: Laser power
VR2: RF offset (RF.OFS)
VR3: Focus gain (FCS.GAN)
VR4: Tracking gain (TRK.GAN)
VR5: Tracking balance (TRK.BAL)
VR6: Focus offset (FCS.OFS)
VR7: Tracking offset (TRK.OFS)
VR8: VCO adjust (VCO.ADJ)

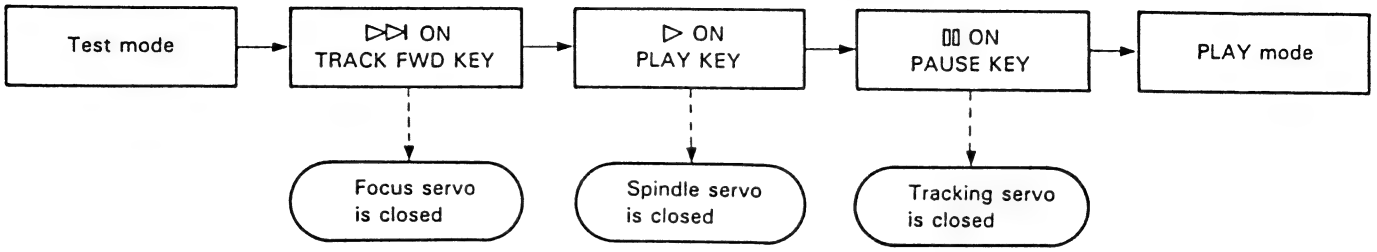
Adjustment Point



In the test mode, the servos must be closed and opened individually. Consequently, the servos must each be closed in the proper sequence (serial sequence) in order to put the machine into the play mode. Note also that the machine will not enter the play mode when the PAUSE (▯▯) key is pressed.

For example, in order to change from the stop to the play mode, the function keys must be pressed in the following order:

* In the test mode, the servos must be operated in serial sequence.



● KEY FUNCTIONS IN THE TEST MODE

Symbol	Key name	Function in test mode	Description
▷▷|	TRACK FWD	Focus servo close	Turns ON the laser diode, and raises and lowers the focusing actuator to close the focus servo.
▷	PLAY	Spindle servo close	Closes the servo in the CLV-A mode after kicking the spindle motor.
▯▯	PAUSE	Tracking servo close/open	Acts as a toggle: closes the tracking servo and activates play mode when pressed (provided the focus and spindle servos are closed), at which time the PAUSE indicator illuminates; opens the tracking servo when pressed again.
◁◁	MANUAL SEARCH REV	Carriage reverse (moves inward)	Moves carriage quickly (3cm/s) toward innermost track. Be careful not to move too far as there is no safety device to stop the carriage.
▷▷	MANUAL SEARCH FWD	Carriage forward (moves outward)	Moves carriage quickly (3cm/s) toward outermost track. Be careful not to move too far as there is no safety device to stop the carriage.
□	STOP	Stop	Stops all servos and returns system to its initial state.
⏏	OPER/CLOSE	Disc tray open/close	Opens and closes the disc tray. However, pickup does not return to rest on OPEN, and it remains stationary on CLOSE.

Table 10-1.

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
1	Tracking error offset, focus offset and RF offset adjustment					
			TP1 Pin 2 (TRK. ERR)	VR5 (TRK. BAL) VR7 (TRK. OFS)	Tracking error offset 45° 0V±50mV	● Put unit in the test mode (see page 35). ● Set VR5 TRK.BAL (tracking balance) to the position about 45° to the left of center. ● Adjust VR7 TRK.OFS(tracking offset) so that the TRK.ERR (tracking error) voltage at TP1 pin 2 becomes 0V ± 50mV.
			TP1 Pin 6 (FCS. ERR)	VR6 (FCS.OFS)	Focus offset 0V ± 50mV	● Adjust VR6 FCS.OFS (focus offset) so that the FCS.ERR (focus error) voltage at TP1 pin 6 becomes 0V ± 50mV.
			TP1 Pin 1 (RF. OUTPUT)	VR2 (RF.OFS)	RF offset 100mV ± 50mV	● Adjust VR2 RF.OFS (RF offset) so that the RF output voltage at TP1 pin 1 becomes 100mV ± 50mV. Note: When adjusting the tracking error offset, always perform "5. Tracking Balance Adjustment."
2	LD (laser diode) power check					
				VR1	Specification: 0.13mW ± 0.01mW	● Put unit in the test mode (see page 35). ● Press the TRACK FWD (▷▷|) key to turn ON the laser diode. ● Place the sensor of the optical power meter directly above the objective lens and confirm that LD power is 0.13mW ± 0.01mW. ● If the reading is not conforms specification, adjust VR1 (LD power adjust) so that the laser diode power conforms to specification.
3	Focus lock and spindle lock check					
						● Set the test disc. ● Put unit in the test mode (see page 35). ● Press the MANUAL SEARCH FWD (▷▷) key to move the pickup to the center of the disc.
	V 0.5V/div	H 100msec/ div	TP1 pin1 (RF output)		RF signal is output	● Observe the output of TP1 pin 1 (RF output) on the oscilloscope. Confirm that the RF signal is output after the TRACK FWD (▷▷|) key is pressed.
					Forward (clockwise) rotation	● Press the PLAY (▷) key and confirm that the disc rotates at constant speed (approx. 30 rpm near center of disc) in the forward (clockwise) direction; disc may not run away or rotate counterclockwise.

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
4	Grating adjustment (1)					

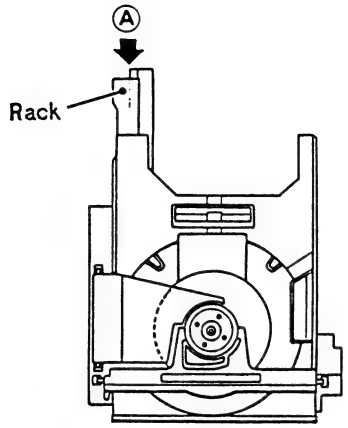


Fig. 10-1

Remove the disc tray before beginning this adjustment.

● Removal of the disc tray

1. Press the rear edge of the rack, marked Ⓐ in Fig. 10-1, while pulling the disc tray out to the position where it catches, illustrated in Fig. 10-2.

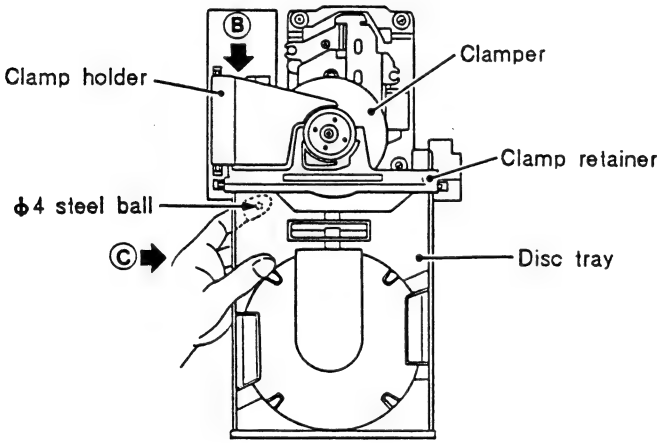


Fig. 10-2

2. While pulling the clamp holder Ⓑ (see Fig. 10-2) upward with the right hand, hold the tray as indicated by Ⓒ in the left hand and pull it outward. Take care not to allow the ϕ4 steel ball to fall (we recommend holding the ball in place with the left index finger while extracting the tray).

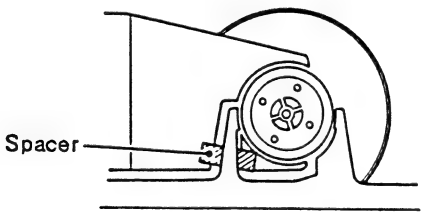


Fig. 10-3

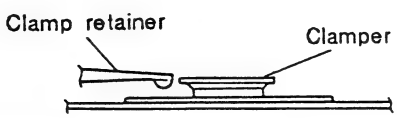


Fig. 10-4

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
						● Put unit in the test mode (see page 35). ● Press the MANUAL SEARCH FWD (▷▷) key to move the pickup to the vicinity of what would be the center of the disc. Position the pickup so its grating adjusting screw is visible through the elongated hole on the spindle motor side of the servo mechanism base plate. ● As shown in Fig. 10-5, insert a (slotted) screwdriver from the rear of the mechanism and check that the grating adjusting screw can be rotated. ● Mount the test disc; be sure to insert a 3 — 5 mm spacer (if no spacer is available, use a hex wrench) between the clamp holder and clamp retainer, as shown in Fig. 10-3. ● Confirm that the clamper and the clamp retainer are not contacting one another (Fig. 10-4). ● Press the TRACK FWD (▷▷|) and the PLAY (▷) keys sequentially to close the focus and spindle servos (do not close the tracking servo). ● Insert a 4kHz-cutoff low pass filter between the oscilloscope and TP1 pins 2 (TRK.ERR) and 4 (GND) as shown in Fig. 10-6 and observe the waveform of TP1 pin 2 (tracking error) on the oscilloscope.
	0.5V/div	5ms/div	TP1 Pin 2 TRK. ERR	Grating adjusting screw	Null point	● Turn the grating adjusting screw with the ⊖ screwdriver to find the null point (see Photo 10-1).
				Grating adjusting screw	Max. amplitude	● Next, slowly rotate the screw clockwise and adjust to the point where the waveform (tracking error signal) first achieves its maximum amplitude (see Photo 10-3).
						Note: Avoid applying pressure to the ⊖ screwdriver while adjusting the screw. Doing so causes the pickup to move inward, making adjustment more difficult.
						● Lastly, remove the low pass filter and confirm that the tracking error signal p-p voltage does not greatly vary when the pickup is moved to the inner-most and outer-most tracks of the disc. If the levels diverge by ±10% or more, re-adjust the maximum error amplitude point by rotating the grating adjusting screw.

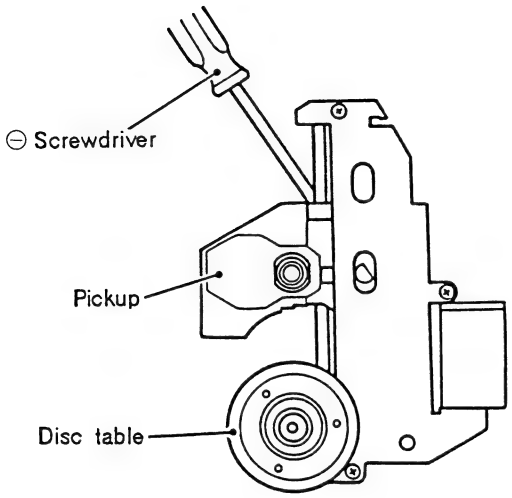


Fig.10-5

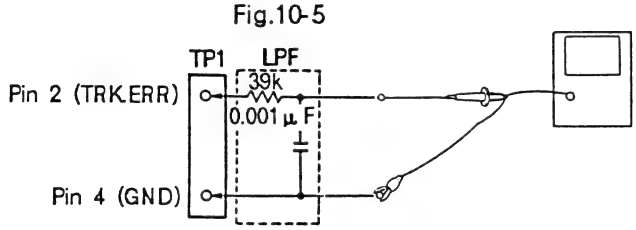


Fig. 10-6

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
						Re-mount the disc tray according to the following procedure when the grating adjustment is complete. 1. Remove the disc and the spacer. 2. While lifting the clamp holder [marked Ⓑ in Fig. 10-2] with the right hand, hold the tray in the left hand as indicated by Ⓒ and slide the slide base into the hard resin fittings on the loading base as shown in Fig. 10-7 to re-insert the disc tray. At this time, be sure to hold the steel ball in place with the index finger of the left hand. Also, be careful that the front panel is not damaged by the slide base and bearing of the steel ball's bearing (in the slide base) coming into contact with the panel. 3. Insert the slide base so that it fits into the two hard resin fittings at the rear of the loading base (see Fig. 10-8). 4. Insert the tray all the way.

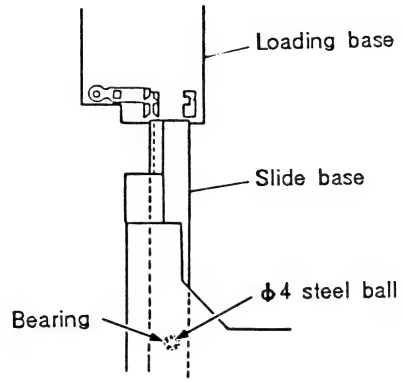


Fig. 10-7

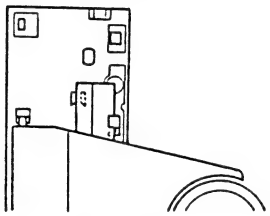


Fig. 10-8

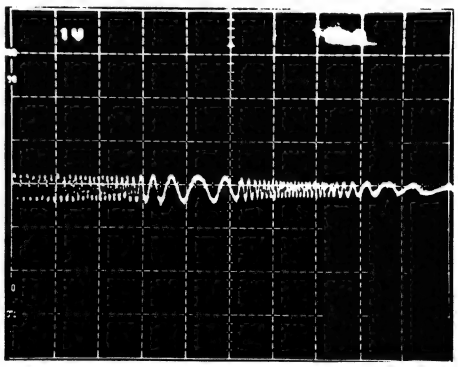


Photo 10-1 Null point

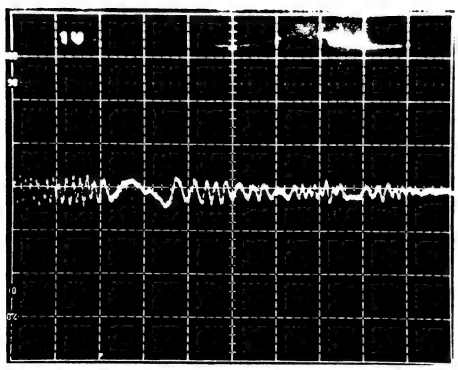


Photo 10-2 This is not the null-point waveform.

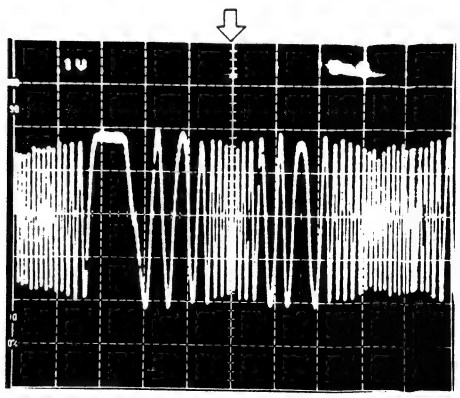


Photo 10-3 Maximum amplitude

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
4	Grating Adjustment (2) (using discs with a recording time of 60 min. or more)					
	0.5V/div	5ms/div	TP1 Pin 2 (TRK.ERR)	Grating	Null point	● Insert a ⊖ screwdriver into the grating hole, turn and find the null point (see Photo 10-1).
				Grating	Maximum amplitude	● Next, slowly turn the screwdriver clockwise from the null point and adjust until the waveform (tracking error signal) reaches maximum amplitude (see Photo 10-3).

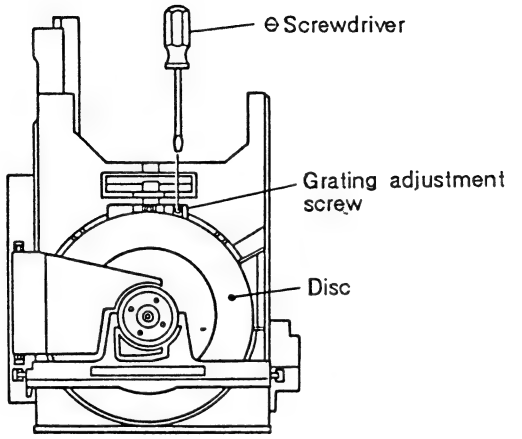


Fig.10-9

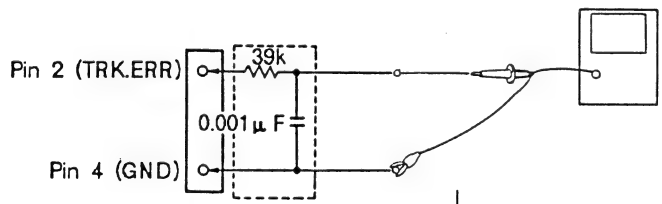


Fig.10-10

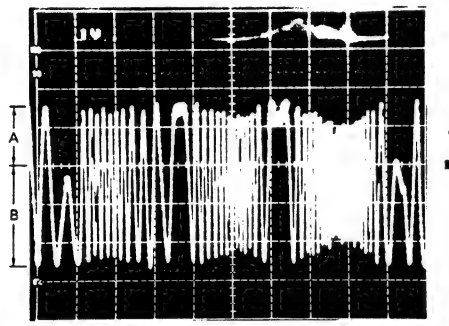
Note: This adjustment can only be performed with a disc having pits up to R115mm, not with the Test Disc (YEDS-7).

- Put unit in the test mode (see page 35).
- Load the test disc, shift the pickup to the outer periphery so that the pickup grating adjustment hole is visible from the pit surface of the disc or from the hole in the servo mechanism (see Fig. 10-9).
- Press the TRACK FWD key (▷▷|) and PLAY key (▷) in sequence to turn on the focus servo and spindle servo (do not turn on the tracking servo).
- Observe the TRK.ERR (tracking error) waveform at TP1 pin 2 on an oscilloscope, inserting a 4kHz low-pass filter (see Fig. 10-10).

Note: Use caution since inserting the ⊖ screwdriver forcefully will cause the pickup unit to float upward.

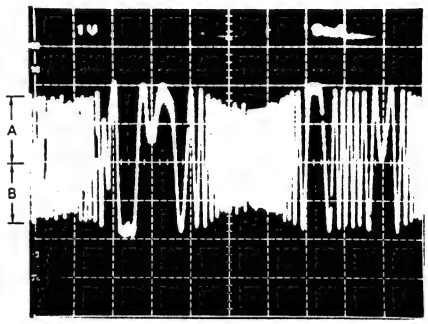
- Finally, make sure that there is no major fluctuation in the p-p voltage of the tracking error signal (do not insert the cutoff 4kHz low-pass filter) when the pickup is shifted to the inner periphery and when the pickup is shifted to the outer periphery. If there is a difference of more than ±10% again rotate the grating adjustment screw and adjust the tracking error signal to maximum.

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
5	Tracking balance adjustment					
	0.5V/div	5ms/div	TP1 Pin 2 (TRK. ERR)	VR5 (TRK.BAL)		● Load the test disc. ● Put unit in the test mode (see page 35). ● Press the MANUAL SEARCH FWD (▷▷) key to position the pickup near the center of the disc. ● Press the TRACK FWD (▷▷|) and PLAY (▷) keys sequentially to cause the disc to rotate. ● Observe TP1 pin 2 TRK.ERR (tracking error) on the oscilloscope and adjust VR5 TRK.BAL(tracking balance) to eliminate th DC elements from the tracking error signal.
6	Tangential adjustment					
						● Put unit in the test mode (see page 35). ● Open the tray and load the test disc. ● Press the MANUAL SEARCH FWD (▷▷) key to position the pickup near the center of the disc. ● Insert a hex wrench into the tangential adjustment screw section from the rear of the mechanism. ● Close the tray. Note: Do not use an L-shaped hex wrench. Use one such as shown to the left. Using an L-shaped hex wrench can cause the tray to come loose (see page 38 4. Grating Adjustment (1)).



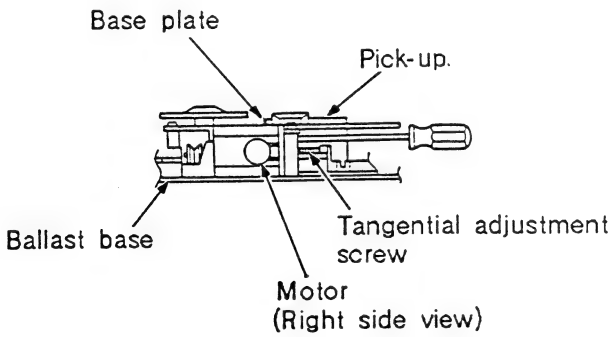
A≠B ➡

Photo 10-4 DC elements mixed in signal



A= B

Photo 10-5 DC elements eliminated



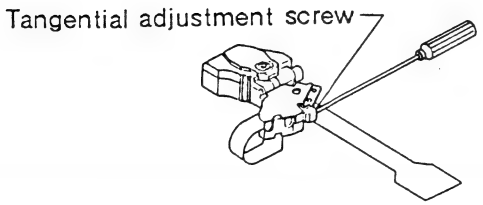
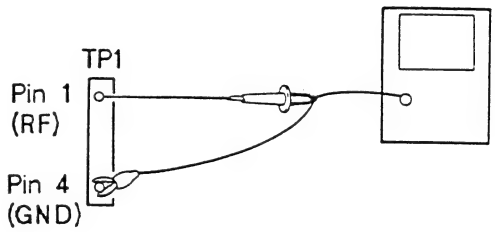


Fig.10-11

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
		200ns	TP1 Pin 1 RF output	Tangential adjustment screw	Sharpest possible eye pattern	● Press the TRACK FWD (▷▷|), PLAY (▷), and PAUSE (▯▯) keys sequentially to close the all servos (pause indicator will illuminate). ● Observe TP1 pin 1 (RF output) on the oscilloscope and adjust the tangential adjustment screw to achieve the sharpest possible eye pattern. ● The point to which the adjusting screw should be set lies about halfway between the points at which the eye pattern becomes most blurred when the screw is rotated clockwise and counterclockwise. When the whole waveform becomes clear, concentrate on sharpening the fine lines forming the diamond at the center of the eye pattern (see Photo 10-8). Adjust until the fine lines on all four sides of the diamond are both sharply defined and dense, as shown in Photo 10-6.  Fig. 10-12 Note: Use a hex wrench to raise the pickup somewhat while making this adjustment.

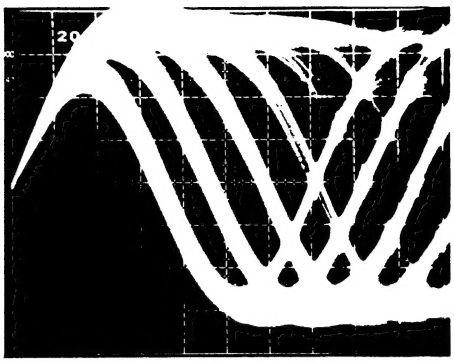


Photo 10-7

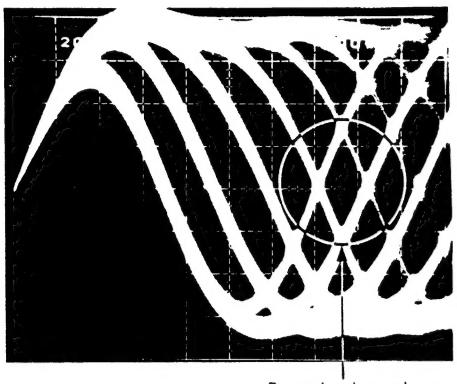


Photo 10-6

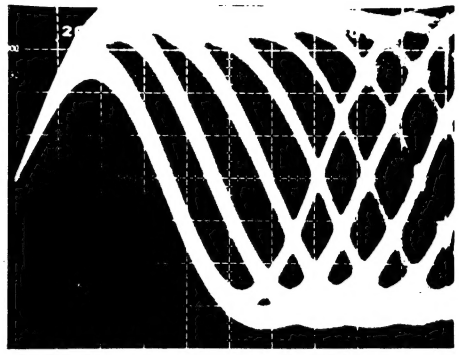


Photo 10-8

Photo 10-9

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
7	RF level check					
				VR1 (Laser power)	2.0V ± 0.6V	● Put unit in the test mode (see page 35). ● Connect the oscilloscope to TP1 pin 1 (RF output), play the test disc, and measure the P-P voltage of the RF waveform. ● Check that voltage is 2.0 ± 0.6V. ● When 2.6V is exceeded, adjust VR1 so that 2.0V ± 0.6V is obtained.
8	Focus gain adjustment					
	20mV/div 5mV/div CH1(X), CH2(Y) (prove 10:1)		X-axis TP1 Pin 5 (FCS. IN) Y-axis TP1 Pin 6 (FCS. ERR)	VR3 (FCS. GAN)	Phase difference of 90°	● With the oscillator power turned OFF, connect the oscilloscope and oscillator as shown in Fig. 10-13. ● Put unit in the test mode (see page 35). ● Press the TRACK FWD (▷▷|), PLAY (▷), and PAUSE (▯▯) keys sequentially to activate the focus, spindle, and tracking servos. ● Turn ON the power to the oscillator and set it to output a 1.2kHz 1Vp-p signal. Note: Some oscillators discharge a DC voltage when turned on. It is therefore recommended that the oscillator be connected after it has been turned on. ● Adjust VR3 FCS.GAN(focus gain) so that the Lissajous's figure becomes a horizontal circle (phase difference of 90°).

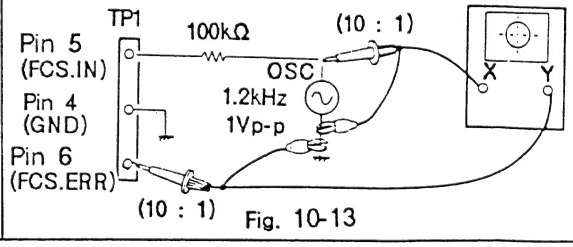


Fig. 10-13

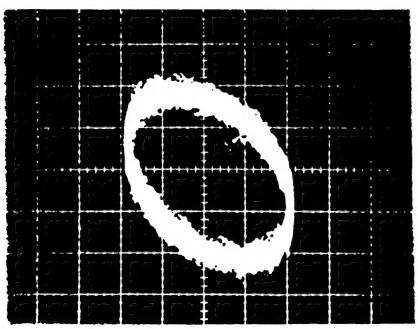


Photo 10-10

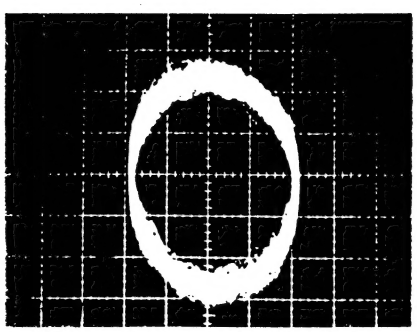


Photo 10-11

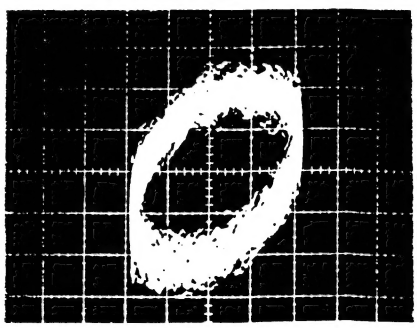


Photo 10-12

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
9	Tracking gain adjustment					
	50mV/div 5mV/div CH1(X), CH2(Y) (prove 10:1)		X-axis TP1 Pin 3 (TRK. IN) Y-axis TP1 Pin 2 (TRK. OUT)	VR4 (TRK.GAN)	Phase difference of 90°	● With the oscillator power turned OFF, connect the oscilloscope and oscillator as shown in Fig. 10-14. ● Put unit in the test mode (see page 35). ● Press the TRACK FWD (▷▷I), PLAY (▷), and PAUSE (▯▯) keys sequentially to activate the focus, spindle, and tracking servos. ● Turn ON the power to the oscillator and set it to output a 1.2kHz 2Vp-p signal. Note: Some oscillators discharge a DC voltage when turned on. It is therefore recommended that the oscillator be connected after it has been turned on. ● Adjust VR4 TRK.GAN (tracking gain) so that the Lissajous's figure becomes a horizontal circle (phase difference of 90°).

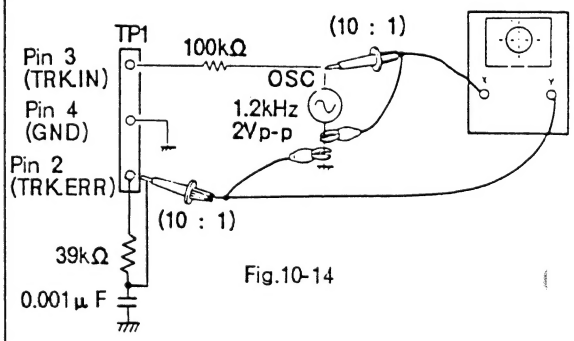
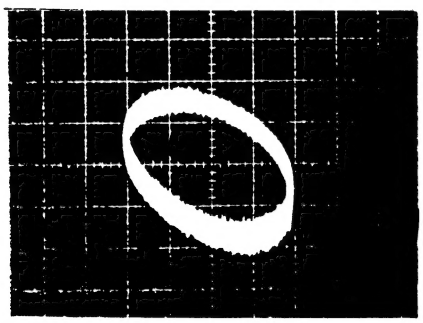
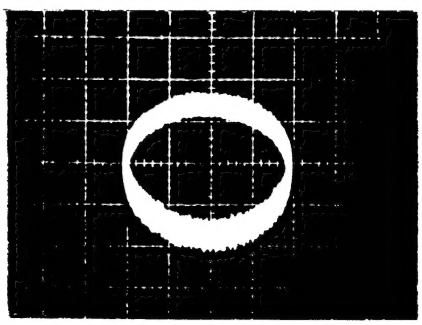


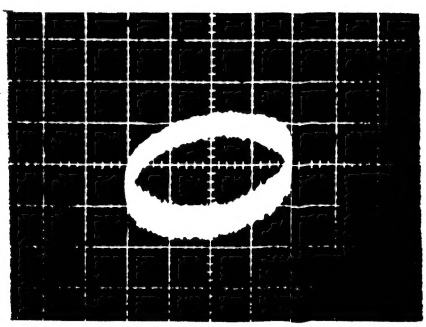
Fig.10-14



Gain overcompensated
Photo 10-13



Gain optimal
Photo 10-14



Gain undercompensated
Photo 10-15

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
10	VCO free-run adjustment					
			TP2 Pin 2	VR8 (VCO.ADJ)	4.375 ±0.025MHz	● Put unit in the test mode (see page 35). ● Short the ASY and GND jumper with a screwdriver or similar tool (see Fig. 10-15). ● Connect a frequency counter capable of measuring frequencies of 10MHz and above to TP2 pin 2. ● Adjust VR8 (VCO adjust) so that the frequency counter reading becomes 4.375 ± 0.025MHz.
11	Method for confirming focus error					
			TP1 Pin 6 (FCS. ERR)			● Put unit in the test mode (see page 35). ● Ground TP1 pin 5 FCS.IN (focus in) to GND. ● Observe the waveform output by TP1 pin 6 FCS.ERR (focus error) when the TRACK FWD (▷▷|) key is pressed.

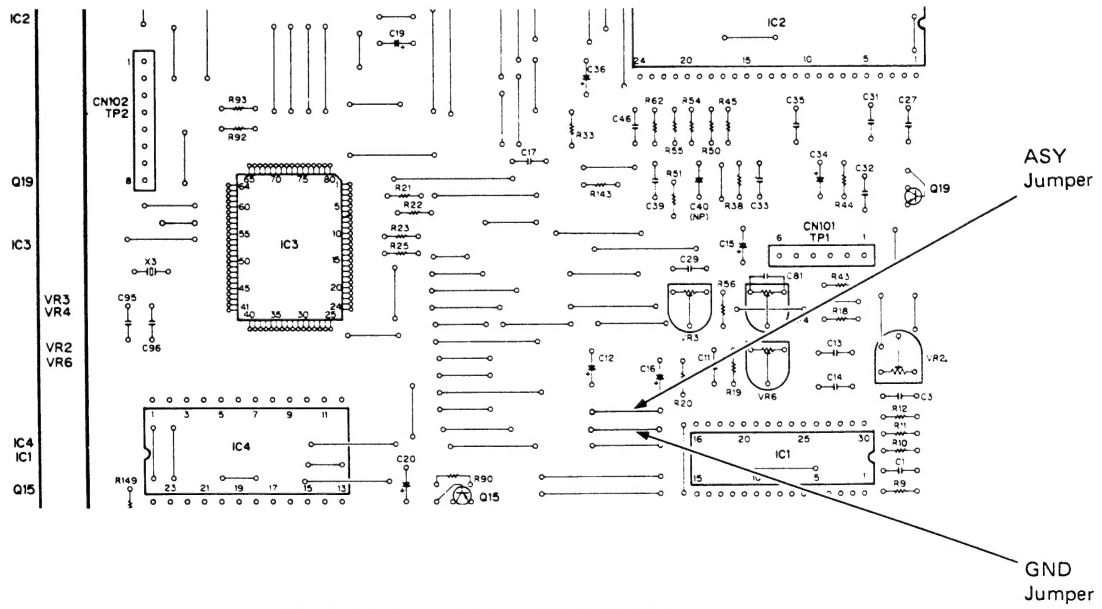


Fig. 10-15 ASY and GND Jumper position